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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,219	04/16/2004	Homayoun Talieh	ASMNUT.006C5	1174

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EXAMINER
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ZHENG, LOIS L

ART UNIT	PAPER NUMBER
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1742

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	03/27/2007	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 03/27/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com  
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<b>Office Action Summary</b>	<b>Application No.</b> 10/826,219	<b>Applicant(s)</b> TALIEH ET AL.	
	<b>Examiner</b> Lois Zheng	<b>Art Unit</b> 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-67 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 62-67 is/are allowed.
- 6) ☒ Claim(s) 1-8, 12-19, 24-48 and 55-61 is/are rejected.
- 7) ☒ Claim(s) 9-11, 20-23 and 49-54 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/16/04, 10/31/06</u> | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Status of Claims***

1. Claims 1-67 are currently under examination.

### ***Means-Plus-Function Language***

2. Instant claims 40-41 contain the flowing terms written in means-plus-function format, and have been interpreted as follows:

“means to deliver solution” (claims 40-41) is NOT in proper means-plus-function format and does not invoke 35 U.S.C. 112, 6<sup>th</sup> paragraph.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-8, 25-41 and 58-61 are rejected under 35 U.S.C. 102(e) as being anticipated by Adams et al. US 6,143,155(Adams).

Adams teaches a non-contact electroplating and electroplanarization apparatus comprising an anode and a cathode (Fig. 4 # 200 and 180), both of which proximate a wafer surface without physically touching the surface of the wafer wherein an electrical connection is made through the electrolyte solution. Both electrodes are present in the electrolyte solution.

Art Unit: 1742

Regarding claim 1, the cathode as taught by Adams reads on the claimed at least one electrical contact placed in proximity of the wafer surface and anode as taught by Adams reads on the claimed electrode in the presence of the solution. In addition, the apparatus of Adams are capable of applying a potential difference between the at least one electrical contact to remove conductive material from the surface of the wafer.

Regarding claims 2-7 and 27, Adams further teaches a non-conducting, porous brush on the bottoms of the electrode housing, wherein the brush rubs the surface of the wafer during the electropolishing process(Fig. 7 # 595, col. 10 lines 13-29). Therefore, the brush as taught by Adams reads on the claimed pad having the claimed top surface. The examiner considers that the cathode as taught by Adams(i.e. electrical contact) is in the pad as claimed based on the broadest reasonable interpretation. The top surface of the brush as taught by Adams is adapted to polish the surface of the wafer as claimed. Adams further teaches providing relative motion between the electrodes and the wafer surface(abstract), which implies the claimed mechanism to provide this relative motion.

Regarding claims 8 and 38, the cathode as taught by Adams reads on the claimed conductive element.

Regarding claims 25-26, since the brush of Adams is porous, the brush as taught by Adams has the claimed channels configured to pass the solution.

Regarding claim 31, Adams further teaches a wafer holding assembly, which reads on the claimed carrier head to hold the wafer.

Art Unit: 1742

Regarding claim 32, the electrodes as taught by Adams does hold the pad as claimed(Fig. 7).

Regarding claim 33, Adams teaches the relative motion between the pad and the surface of the wafer, which implies the claimed relative motion between the pad and the carrier head as claimed.

Regarding claims 28-30 and 34-36, Adams further teaches moving just the wafer, or moving just the electrode, or moving both the wafer and the electrode as claimed.

Regarding claim 37, Adams teaches that the conductive material on the surface of the wafer is copper as claimed(Abstract).

Regarding claim 39, the brush(i.e. pad) as taught by Adams rests on the conductive element as claimed(Fig. 7).

Regarding claims 40-41, Adams further teaches fluid input line to supply the solution(Fig. 7 # 560, col. 10 lines 39-41) to the brush(i.e. pad). Since the brush of Adams is porous, the fluid input line as taught by Adams delivers the solution through channels in the pad as claimed.

Regarding claim 58, the anode of Adams reads on the claimed first conductive element, the porous brush of Adams reads on the claimed pad having at least one open area and the cathode of Adams reads on the claimed second conductive elements disposed approximate but not touching the conductive surface as claimed.

Regarding claim 59, the open pores in the brush of Adams define a conductive material removal area as claimed.

Art Unit: 1742

Regarding claim 60, the instant claim is rejected for the same reasons as stated in the rejection of claims 6, 33, 28-30 and 34-36 above.

Regarding claim 61, the cathode of Adams(i.e. at least one contact) is below the top surface of the pad as claimed.

5. Claims 1, 12-13, 37 and 42 are rejected under 35 U.S.C. 102(e) as being anticipated by Talieh et al. US 6,251,235 B1(Talieh).

Talieh teaches an electroplating apparatus comprising at least one electrical contact placed in proximity with the surface of a wafer adapted to electrically connect the at least one electrical contact with the surface of the wafer without physically touching the wafer(Figs. 2-3 #21), and an electrode in the presence of the electrolyte solution(Fig. 2 #19) as claimed.

Regarding claim 1, the apparatus of Talieh meets the limitations of the instantly claimed apparatus. The apparatus of Talieh is capable of performing the claimed removal of conductive wafer surface when electrical current is applied in a reverse direction. Talieh also teaches that its apparatus can be used to etch a metal layer from the periphery of the workpiece.

Regarding claim 12, Talieh further teaches that electrical potential can be applied to multiple liquid chambers on the peripheral of the wafer(Fig. 4A-B, col. 5 lines 35 – 55) which implies a plurality of contacts must be connected to each of the liquid chambers in order to provide electrical potential to each of the chambers. Therefore, Talieh inherent teaches the claimed plurality of contacts.

Art Unit: 1742

Regarding claim 13, since the plurality of contacts inherently taught by Talieh are evenly spaced out along the peripheral of the wafer, the examiner considers that the contacts of Talieh are distributed in a pattern as claimed.

Regarding claim 37, Talieh teaches removing copper on the edge of the wafer(col. 6 lines 4-6) as claimed.

Regarding claim 42, the instant claim is rejected for the same reasons as stated in the rejection of claims 1 and 12 above.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 12-19, 42-48 and 56-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams in view of Nogami et al. US 6,106,680(Nogami).

The teachings of Adams are discussed in paragraph 4 above. However, Adams does not explicitly teach the claimed plurality of electrical contacts.

Nogami teaches an electroplating apparatus comprising a cathode platter having a plurality of cathode contact pins on a grid type array held in place by a plurality of connection bars in order to provide uniform current density over the surface area of the wafer(col. 2 line 66 – col. 3 line 42, col. 5 line 18 – col. 6 line 30).

Regarding claims 12-14, one of ordinary skill in the art would have found it obvious to have incorporated the cathode platter of Nogami in to the cathode of Adams

Art Unit: 1742

in order to provide uniform current density over the surface area of the wafer as taught by Adams. Therefore, Adams in view of Nogami teaches a plurality of contacts distributed in a pattern as claimed.

Regarding claim 15, since the cathode of Adams in view of Nogami is covered by the brush of Adams(i.e. pad), the plurality of the contacts as taught by Adams in view of Nogami would also be covered the brush(i.e. pad), which would read on the claimed contacts in the pad based on the broadest reasonable interpretation.

Regarding claims 16-18, the instant claims are rejected for the same reasons as stated in the rejection of claims 4-7 in paragraph 4 above.

Regarding claim 19, the bus bar as taught by Adams in view of Nogami reads on the conductive element connecting the plurality of contacts as claimed.

Regarding claim 42, Adams in view of Nogami teach the claimed plurality of electrical contacts positioned in proximity of the wafer surface without touching the surface. The anode as taught by Adams in view of Nogami reads on the claimed electrode to be connected to the power source to establish a potential to electropolish the conductive material on the surface of the wafer as claimed.

Regarding claim 43, the porous brush as taught by Adams in view of Nogami reads on the claimed pad having a top surface positioned between the surface of the wafer and the electrode wherein the solution flows between the top surface of the pad and the surface of the wafer as claimed.

Regarding claims 44-48, the instant claims are rejected for the same reasons as stated in the rejection of claims 15-19 above.



Art Unit: 1742

Regarding claims 56-57, the porous pad as taught by Adams in view of Nogami implies channels for solution flow as claimed.

8. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Adams in view of Sun et al. US 6,299,741(Sun).

The teachings of Adams are discussed in paragraph 4 above. However, Adams does not explicitly teach that the top surface of the pad includes abrasives as claimed.

Sun teaches that both a standard polishing pad without abrasive particles and a polishing pad having abrasive particles are suitable pads that can be used in planarization processes(col. 1 lines 38-42).

Regarding claim 24, one of ordinary skill in the art would have found it obvious to have substituted the polishing brush as taught by Adams with a polishing pad containing abrasives with expected success since Sun teaches that a polishing pad with abrasives is functionally equivalent as a polishing pad without abrasives.

9. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Adams in view of Nogami, and further in view of Sun.

The teachings of Adams in view of Nogami are discussed in paragraph 7 above. However, Adams in view of Nogami do not explicitly teach that the top surface of the pad includes abrasives as claimed.

Sun teaches that both a standard polishing pad without abrasive particles and a polishing pad having abrasive particles are suitable pads that can be used in planarization processes(col. 1 lines 38-42).

Art Unit: 1742

Regarding claim 55, one of ordinary skill in the art would have found it obvious to have substituted the polishing brush as taught by Adams in view of Nogami with a polishing pad containing abrasives with expected success since Sun teaches that a polishing pad with abrasives is functionally equivalent as a polishing pad without abrasives.

***Allowable Subject Matter***

10. Claims 9-11, 20-23 and 49-54 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
11. Claims 62-67 are allowed.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1742

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LLZ

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